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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,986	11/18/2003	Tiezhi Zhang	1512.027	4893

23598 7590 01/24/2007  
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MILWAUKEE, WI 53202

EXAMINER
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TOTH, KAREN E

ART UNIT	PAPER NUMBER
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3735

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/24/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/715,986	<b>Applicant(s)</b> ZHANG ET AL.	
	<b>Examiner</b> Karen E. Toth	<b>Art Unit</b> 3735	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 November 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-14 and 16-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-11, 14 and 16-25 is/are allowed.
- 6) ☒ Claim(s) 12, 13, 26 and 27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to anticipate or make obvious the method and structure of claims 2-11, 14, and 16-25, including, *inter-alia*, using chest displacement signals to correct an integration offset of a lung volume signal to produce a corrected respiration signal based on a chest displacement signal.

### ***Response to Arguments***

2. Applicant's arguments, see remarks, filed 29 November 2006, with respect to the rejection(s) of claim(s) 12-13 and 26-27 under Erbel (US Patent Application Publication 2002/0115923) in view of Hoffman (US Patent Application Publication 2002/0120207) and Corn (US Patent 6062216) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Mostafavi'266 (US Patent 6959266) in view of Sackner (US Patent 6413225); and Mostafavi (US Patent Application Publication 2004/0116804) in view of Sackner.

### ***Claim Rejections - 35 USC § 103***

3. Claims 12 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mostafavi'266 in view of Sackner.

Art Unit: 3735

Regarding claim 12, Mostafavi'266 discloses a radiation therapy system comprising a laser sensor adapted to monitor chest displacement during breathing (column 3, lines 48-57); and a controllable radiation source that delivers radiation to a patient based upon the respiration signal (column 5, lines 34-44). Mostafavi'266 does not disclose capturing an air flow signal using a spirometer, calibrating the signals by combining the air flow signal with the laser signal, and using the calibrated signal for radiation gating.

Sackner teaches a system for monitoring respiration comprising a spirometer for measuring air flow (element 22; column 4 line 66 to column 5 line 1); a sensor for monitoring chest displacement (elements 12, 14); and a calibration circuit that combines the air flow and chest displacement signals to obtain a corrected respiration signal (column 3, lines 38-48), in order to most accurately monitor the patient's respiration. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have made the system of Mostafavi'266 with a spirometer for measuring air flow and a circuit to combine the air flow and chest displacement signals to obtain a corrected respiration signal, as taught by Sackner, in order to more accurately monitor respiration during radiation gating.

Regarding claim 26, Mostafavi'266 discloses method of delivering radiation therapy comprising using a laser sensor adapted to monitor chest displacement during breathing (column 3, lines 48-57); and using a controllable radiation source to deliver radiation to a patient based upon the respiration signal (column 5, lines 34-44). Mostafavi'266 does not disclose capturing an air flow

Art Unit: 3735

signal using a spirometer, calibrating the signals by combining the air flow signal with the laser signal, and using the calibrated signal for radiation gating.

Sackner teaches a method for monitoring respiration comprising using a spirometer to measure air flow (element 22; column 4 line 66 to column 5 line 1); a sensor for monitoring chest displacement (elements 12, 14); and using a calibration circuit to combine the air flow and chest displacement signals to obtain a corrected respiration signal (column 3, lines 38-48), in order to most accurately monitor the patient's respiration. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have made the method of Mostafavi'266 and used a spirometer to measure air flow and a circuit to combine the air flow and chest displacement signals to obtain a corrected respiration signal, as taught by Sackner, in order to more accurately monitor respiration during radiation gating.

4. Claims 13 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mostafavi'804 in view of Sackner.

Regarding claim 13, Mostafavi'804 discloses a medical imaging system comprising a laser displacement sensor adapted to monitor chest displacement during breathing and provide a chest displacement signal (paragraphs [0044]-[0045], [0047]); and an imager that acquires component image signals from the internal anatomy of a patient over different phases of respiration and mathematically combines them according to respiration phases to produce a composite image of the internal anatomy (paragraphs [0088], [0090]-[0097]).

Art Unit: 3735

Mostafavi'804 does not disclose capturing an air flow signal using a spirometer, calibrating the signals by combining the air flow signal with the laser signal, and using the calibrated signal for gating the image captures.

Sackner teaches a system for monitoring respiration comprising a spirometer for measuring air flow (element 22; column 4 line 66 to column 5 line 1); a sensor for monitoring chest displacement (elements 12, 14); and a calibration circuit that combines the air flow and chest displacement signals to obtain a corrected respiration signal (column 3, lines 38-48), in order to most accurately monitor the patient's respiration. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have made the system of Mostafavi'804 with a spirometer for measuring air flow and a circuit to combine the air flow and chest displacement signals to obtain a corrected respiration signal, as taught by Sackner, in order to more accurately monitor respiration while capturing images.

Regarding claim 27, Mostafavi'804 discloses a method of capturing medical images comprising using a laser displacement sensor adapted to monitor chest displacement during breathing and provide a chest displacement signal (paragraphs [0044]-[0045], [0047]); acquiring component image signals from the internal anatomy of a patient over different phases of respiration and mathematically combining them according to respiration phases to produce a composite image of the internal anatomy (paragraphs [0088], [0090]-[0097]). Mostafavi'804 does not disclose capturing an air flow signal using a spirometer,

Art Unit: 3735

calibrating the signals by combining the air flow signal with the laser signal, and using the calibrated signal for gating the image captures.

Sackner teaches a method of monitoring respiration comprising using a spirometer to measure air flow (element 22; column 4 line 66 to column 5 line 1); using a sensor to monitor chest displacement (elements 12, 14); and combining the air flow and chest displacement signals to obtain a corrected respiration signal (column 3, lines 38-48), in order to most accurately monitor the patient's respiration. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have made the method of Mostafavi'804 using a spirometer to measure air flow and combining the air flow and chest displacement signals to obtain a corrected respiration signal, as taught by Sackner, in order to more accurately monitor respiration while capturing images.

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent 4373534 to Watson, which discloses a similar system and method.

US Patent 4815473 to Watson, which discloses a similar system and method.

Robinson, T.E., et al.; "Standardized High-Resolution CT of the Lung Using A Spirometer-Triggered Electron Beam CT Scanner"; AJR:172; Jun. 1999; pp. 1636-1638.

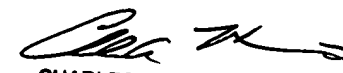
Art Unit: 3735

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karen E. Toth whose telephone number is 571-272-6824. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Marmor, II can be reached on 571-272-4730. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
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